

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

see form PCT/ISA/220

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/IB2008/050946

International filing date (day/month/year)
14.03.2008

Priority date (day/month/year)
14.03.2007

International Patent Classification (IPC) or both national classification and IPC
INV. H04R19/00 G06F3/043

Applicant
EPOS TECHNOLOGIES LIMITED

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



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Date of completion of
this opinion

see form
PCT/ISA/210

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/IB2008/050946

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:
 - ☒ the international application in the language in which it was filed
 - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).
2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ on paper
 - ☐ in electronic form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in electronic form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

Box No. II Priority

1. ☒ The validity of the priority claim has not been considered because the International Searching Authority does not have in its possession a copy of the earlier application whose priority has been claimed or, where required, a translation of that earlier application. This opinion has nevertheless been established on the assumption that the relevant date (Rules 43bis.1 and 64.1) is the claimed priority date.
2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43bis.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.
3. Additional observations, if necessary:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/B2008/050946

Box No. IV Lack of unity of invention

1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has, within the applicable time limit:
- ☒ paid additional fees
 - ☐ paid additional fees under protest and, where applicable, the protest fee
 - ☐ paid additional fees under protest but the applicable protest fee was not paid
 - ☐ not paid additional fees
2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
- ☐ complied with
 - ☒ not complied with for the following reasons:
see separate sheet
4. Consequently, this report has been established in respect of the following parts of the international application:
- ☒ all parts.
 - ☐ the parts relating to claims Nos.

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | |
|-------------------------------|-------------|-------------------------------|
| Novelty (N) | Yes: Claims | <u>1-36, 38-43, 47, 51-68</u> |
| | No: Claims | <u>37, 44-46, 48-50</u> |
| Inventive step (IS) | Yes: Claims | <u>52, 53</u> |
| | No: Claims | <u>1-51, 54-68</u> |
| Industrial applicability (IA) | Yes: Claims | <u>1-68</u> |
| | No: Claims | |

2. Citations and explanations

see separate sheet

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/IB2008/050946

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item IV.

- 1 This Authority considers that there are two separate inventions covered by the claims indicated as follows:

Group 1: **Claims 1-36**, directed to a MEMS microphone comprising a mesh covering the open front side of the case.

Group 2: **Claims 37-68**, directed to an acoustic positioning system comprising a receiver which makes use of two MEMS microphones sensitive to ultrasound waves.

- 1.1 The groups of claims are not linked by common or corresponding special technical features and define two different inventions not linked by a single general inventive concept. Thus, the application does not meet the requirements of unity of invention as defined in Rules 13.1 and 13.2 PCT.

Re Item V.

- 2 Reference is made to the following documents:

- D1: TW 235 010 B (TAIWAN CAROL ELECTRONICS CO LT [TW]) 21 June 2005 (2005-06-21)
D2: US 2005/077102 A1 (BANTER CHAD A [US] ET AL) 14 April 2005 (2005-04-14)
D3: NEUMANN J J ET AL: "CMOS-MEMS membrane for audio-frequency acoustic actuation" SENSORS AND ACTUATORS A, ELSEVIER SEQUOIA S.A., LAUSANNE, CH, vol. 95, no. 2-3, 1 January 2002 (2002-01-01), pages 175-182, XP004377889 ISSN: 0924-4247
D4: JUNGE S ET AL: "Simulation of capacitive micromachined ultrasonic transducers (cMUT) for low frequencies and silicon condenser microphones using an analytical model" 2003 IEEE ULTRASONICS SYMPOSIUM PROCEEDINGS. HONOLULU, HAWAII, OCT. 5 20031005; 20031005 - 20031008 NEW YORK, NY : IEEE, US, vol. 1, 5 October 2003 (2003-10-05), pages 485-488, XP010701172 ISBN: 978-0-7803-7922-0
D5: WO 2007/004119 A (KONINKL PHILIPS ELECTRONICS NV [NL]; PHILIPS INTELLECTUAL PROPERTY [DE]) 11 January 2007 (2007-01-11)

- D6: JIAN CAI ET AL: "A Study on Packaging of PZT MEMS Microphone" 2005 ELECTRONICS COMPONENTS AND TECHNOLOGY CONFERENCE, LAKE BUENA VISTA, FL, USA, [Online] - 3 June 2005 (2005-06-03) pages 1077-1080, XP002488699 piscataway, NJ, USA, IEEE ISBN: 978-0-7803-8907-6 Retrieved from the Internet: URL: <http://ieeexplore.ieee.org/iel5/9844/3/1024/01441405.pdf>>
- D7: WO 2006/100682 A (EPOS TECHNOLOGIES LTD [GB]; RAIF RAN [IL]; KEDEM NOAM [IL]; KOKAREV MI) 28 September 2006 (2006-09-28)
- D8: WO 01/35329 A (ITPEN LTD [IL]; SHOLEV MORDEHAI [IL]) 17 May 2001 (2001-05-17)
- D9: US 2004/032399 A1 (SEKIGUCHI HIDENORI [JP] ET AL) 19 February 2004 (2004-02-19)
- D10: US 2003/151596 A1 (MOYNE WILLIAM P [US] ET AL MOYNE WILLIAM P [US] ET AL) 14 August 2003 (2003-08-14)

INVENTION 1

- 3 The subject-matter of **claim 1** does not involve an inventive step in the sense of Article 33(3) PCT.

The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and discloses:

A MEMS microphone (Fig. 2) comprising:

- a) a case (ref. 300) with an open front side;
- b) a MEMS membrane (ref. 34, 35) mounted on one face of a base (ref. 30-33), the base being mounted inside the case on a substantially closed side; and
- c) a protective acoustic cover covering the front side (clearly visible in Fig. 2); substantially transparent acoustically to at least some of a range of operating frequencies at which the microphone is sensitive.

The subject-matter of claim 1 therefore differs from this known device in that the protective acoustic cover is a mesh.

Realizing a protective acoustic cover by means of a mesh is however well known in the field of microphones, and does not involve the exercise of any inventive skill (see

also D2, Figs. 1a, 1b; par. [0001]-[0007]).

4 Regarding dependent **claims 2-36**:

Regarding **claim 2**, mounting an amplifier in the case does not involve any inventive step.

Regarding **claims 3-19**, determining the adjustments which are necessary for making a MEMS microphone as the one shown in D1 also sensitive to frequencies higher than 20KHz is within the scope of a person skilled in the art (see also D3, par "1. Introduction" and "6. Summary"; D4, par "IV. Simulation of Silicon Condenser Microphones", and Fig. 6; D5, Figs. 8, 9; page 14, lines 4-19).

The subject matter of **claim 20** (membrane facing the front side), **claims 34, 35** (symmetric placement of the microphone) is disclosed by document D1.

Regarding **claims 21-23, 33, 36** projecting a packaging so as to avoid resonances within the operating frequency band is within the scope of a person skilled in the art (see also D6, par. "Abstract"; page 1078, left column, last paragraph - right column, first paragraph; page 1078, right column).

Regarding the subject matter of **claims 24-30** (mesh), determining the necessary characteristics of a mesh is within the scope of a person skilled in the art (see also D2, par. [0051]-[0053]).

Regarding **claims 31, 32**, providing a solid area for placing and picking does not involve the exercise of any inventive activity

INVENTION 2

5 The subject-matter of **claim 37** is not new in the sense of Article 33(2) PCT.

The document D7 in fact discloses:

An acoustic positioning system (Figs. 13, 14) comprising:

a) a receiver (Fig. 13, ref. 1300; page 30, lines 11-13) comprising at least two MEMS microphones (1330, 1420; page 30, lines 16-18; claim 27) that generates a signal in response to ultrasound waves that it receives;

b) an implement (1410; page 33, lines 5-6) that moves relative to the receiver on a positioning surface on top of which the receiver rests, and comprises at least one ultrasound transmitter that transmits ultrasound waves to the receiver; and

c) a controller that uses the signal to track a position of the implement on the positioning surface (1450; page 33, lines 7-8).

6 Regarding dependent **claims 38-68**:

Regarding the subject matter of **claim 38, 42, 43** proper setting and positioning of the microphones of the acoustic positioning system is within the scope of a person skilled in the art (see also document D10, Fig. 4d).

Regarding the additional subject matter of **claims 39-41, 47, 58** (inclined front side) see document D8, Figs. 1b, 1c.

Document D7 further discloses the subject matter of **claims 44, 45** (outer surface of the microphone flush with the surface of the receiver: see Fig. 13), **claim 46** (convexly curved surface: see fig. 13), **claims 48, 49** (infrared transmitters and synchronization: Fig. 15, page 37, lines 1-3; claim 8), **claim 50** (infrared window between microphones: Fig. 13).

Regarding the subject matter of **claim 51** (microphone forward of the infrared window), see document D9, Figs. 3A-3C, par. [0061]-[0063].

Regarding the subject matter of **claim 54**, using RF instead of Infrared transmitters for synchronizing the system does not involve the exercise of any inventive skill.

The subject matter of **claims 55, 60** relates to a well known method for mounting microphones, and receivers in general, to as to get specific directional characteristics (see document D9, Figs. 3A-3C, par. [0061]-[0063]).

Regarding **claims 56, 62, 63, 64, 65, 67, 68** making use of protective grills for the microphones does not involve the exercise of any inventive skill (see also D2, Figs.

1a, 1b; par. [0001]-[0007], [0052]-[0053]).

Regarding **claim 57**, a person skilled in the art would recurr to certain MEMs microphones according to circumstances, without the exercise of any inventive skill.

Regarding **claims 59, 61, 66** making use of electronic printed circuit boards so as to simplify the assembly of the system does not involve the exercise of any inventive activity (see also D7, page 32, lines 7-11).

- 6.1 The combination of the features of dependent **claims 52, 53** is neither known from, nor rendered obvious by, the available prior art. No teachings can in fact be found in prior art which would lead a person skilled in the art to set the microphones of the system shown in D7 forward of the central optical window, and to add other optical windows on adjacent sides of the receiver, thus arriving at the same subject matter of claim 1.

Re Item VII.

- 7.1 Independent claims 1, 37 is not in the two-part form in accordance with Rule 6.3(b) PCT.
- 7.2 The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).
- 7.3 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1, D7 is not mentioned in the description, nor are these documents identified therein.

Re Item VIII.

- 8 The **claims 3-19, 27-30, 38, 68** do not meet the requirements of Article 6 PCT, as they attempt to define the subject-matter in terms of the result to be achieved, without providing the technical features necessary for achieving this result.

Possible steps after receipt of the international search report (ISR) and written opinion of the International Searching Authority (WO-ISA)

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|---------------------|---|
| General information | For all international applications filed on or after 01/01/2004 the competent ISA will establish an ISR. It is accompanied by the WO-ISA. Unlike the former written opinion of the IPEA (Rule 66.2 PCT), the WO-ISA is not meant to be responded to, but to be taken into consideration for further procedural steps. This document explains about the possibilities. |
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|-----------------------------------|---|
| Amending claims under Art. 19 PCT | Within 2 months after the date of mailing of the ISR and the WO-ISA the applicant may file amended claims under Art. 19 PCT directly with the International Bureau of WIPO. The PCT reform of 2004 did not change this procedure. For further information please see Rule 46 PCT as well as form PCT/ISA/220 and the corresponding Notes to form PCT/ISA/220. |
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| Filing a demand for international preliminary examination | In principle, the WO-ISA will be considered as the written opinion of the IPEA. This should, in many cases, make it unnecessary to file a demand for international preliminary examination. If the applicant nevertheless wishes to file a demand this must be done before expiry of 3 months after the date of mailing of the ISR/ WO-ISA or 22 months after priority date, whichever expires later (Rule 54bis PCT). Amendments under Art. 34 PCT can be filed with the IPEA as before, normally at the same time as filing the demand (Rule 66.1. (b) PCT). |
|---|--|

If a demand for international preliminary examination is filed and no comments/amendments have been received the WO-ISA will be transformed by the IPEA into an IPRP (International Preliminary Report on Patentability) which would merely reflect the content of the WO-ISA. The demand can still be withdrawn (Art. 37 PCT).

| | |
|--------------------------|--|
| Filing informal comments | After receipt of the ISR/WO-ISA the applicant may file informal comments on the WO-ISA directly with the International Bureau of WIPO. These will be communicated to the designated Offices together with the IPRP (International Preliminary Report on Patentability) at 30 months from the priority date. Please also refer to the next box. |
|--------------------------|--|

| | |
|--------------------------------|---|
| End of the international phase | At the end of the international phase the International Bureau of WIPO will transform the WO-ISA or, if a demand was filed, the written opinion of the IPEA into the IPRP, which will then be transmitted together with possible informal comments to the designated Offices. The IPRP replaces the former IPER (international preliminary examination report). |
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| Relevant PCT Rules and more information | Rule 43 PCT, Rule 43bis PCT, Rule 44 PCT, Rule 44bis PCT, PCT Newsletter 12/2003, OJ 11/2003, OJ 12/2003 |
|---|--|

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